MISSOURI DEPARTMENT OF NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL QUALITY
ENVIRONMENTAL SERVICES PROGRAM
Standard Operating Procedures

SOP #: MDNR-WQMS-238 EFFECTIVE DATE: November 27, 2001

SOP TITLE: Use and Maintenance of the Barnstead Nanopure II Unit

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SUMMARY OF REVISIONS: Reformatted with minor grammar and spelling corrections

APPLICABILITY: All personnel who use and maintain the Barnstead Nanopure II water purification unit in the Bio-Tox laboratory.

DISTRIBUTION:
MoDNR Intranet
ESP FSS Section Chief
ESP SOP Coordinator
WQMS Section Chief

RECERTIFICATION RECORD:

Date Reviewed				
Initials				

1.0 GENERAL OVERVIEW

1.1 The Barnstead Nanopure II cartridge deionization system is designed to provide Type I Reagent Grade Water that equals or exceeds standards established by the American Society of Testing and Materials (ASTM). The unit utilizes deionized feed-water from the laboratory's Culligan water purification system.

1.2 The Barnstead unit consists of a recirculating pump, a series of four filter modules (filter module = canister, spring, and corresponding filter cartridge), a 0.2 micron final filter, and a combined temperature/purity (resistivity) meter.

1.3 The water supplied by this unit is to be used for the following purposes:

- Rinsing of glassware
- Other uses requiring ultra-pure or Type I water

2.0 OPERATION OF THE BARNSTEAD NANOPURE II UNIT

2.1 Upon turning the unit on, the resistivity meter will automatically go through a series of checks to assure proper performance. This is the self-check sequence.

2.1.1 Display Function - will illuminate displaying three eights and two decimal points (8.8.8).

2.1.2 Error Detection Program - numeric portion of display will disappear leaving the two decimals (..) displayed for a short period of time.

2.1.3 Circuitry Test - the display will go blank for a short time in which the circuitry is being tested for accuracy.

2.1.4 Resistivity Measurement - display will indicate current resistivity measurement corrected to 25 degrees centigrade.

NOTE: Three resistivity set-points "1.0", "10.0", and "16.7" (megohm/cm) correspond to the recommended minimum quality set forth by the following specifications:

- ASTM - 16.7 megohm/cm
- College of American Pathologists/National Committee for Clinical Laboratory Standards (CAP/NCCLS) - 10.0 megohm/cm
- Barnstead (1.0 megohm/cm) endpoint

As long as the water resistivity is at or above the selected set-point, the meter is functioning normally. A low resistivity condition will be indicated by a blinking display, which will cease when resistivity rises above the set-point.

2.2 Error Indications--System performance is automatically verified and malfunctions are indicated as follows:

2.2.1 Blinking decimals indicate that either air is in the system or there is a broken/disconnected wire from the cell to the electronics (refer to instruction manual).

2.2.2 Continuously lit decimals indicate the temperature measuring device is disconnected or there is a broken wire at the cell (requires cell replacement).

2.2.3 Lower case "c" displayed means that the electronics are not functioning and the unit must be returned to the factory.

3.0 Maintenance of the system is required when the resistivity of the water drops below the desired level or the flow from the final filter becomes restricted. In addition, system sanitation may be necessary if residual deposits are found inside the cartridge canisters or testing indicates high bacteriological contamination (heterotrophic bacteria counts >100/10 mls). If sanitation is required it should be done prior to filter cartridge replacement. See section 3.2.

3.1 Change all four filter cartridges together. The filter cartridges are ordered in a set and are to be replaced at the same time. Be sure to check the expiration date on the new filter cartridges as age affects the quality of the water produced. It is very important that the filter cartridge be replaced by the identical filter cartridge (ie. MACROPURE™ filter cartridge or one of the three specific ion exchange filter cartridges) and in the same position as the old ones (Appendix A).

3.1.1 Turn off the pump, close the feed-water valve, and unplug the electrical cord. Unscrew the MACROPURE™ filter module first. This is the first canister (from the left) located directly next to the pump and resistivity meter. Remove the old filter cartridge, being careful not to lose the o-ring at the top.

3.1.2 Inspect the inside of the canister for any residual deposits. If deposits are found, the system should be sanitized. See section 3.2.

3.1.3 Insert the new filter cartridge, with the large opening down, into the canister. Replace the canister into the unit making sure the head is inserted in the hole at the top of the cartridge. Screw the canister into the head by hand being careful not to over tighten and, thereby, damaging the o-ring.

3.1.4 Before changing the three remaining used ion exchange filter cartridges, remove the 0.2 micron final filter (which is found to the far right of the unit above the outlet port).

3.1.5 Reconnect the power and turn on the pump.

3.1.6 Open the faucet valve and run water to the drain for ten minutes to flush any particles from the MACROPURE™ filter cartridge.

3.1.7 Shut off the feed-water, turn power off, and leave the faucet valve open.

3.1.8 Unscrew the remaining filter modules, remove the used filter cartridges, and pour out the water. It is important to use care as to not lose the o-rings.

3.1.9 Rinse the canisters and replace each ion exchange filter cartridge with a new one. See Appendix A for proper filter cartridge order. Be careful not to over tighten the canisters as this will damage the o-ring and cause the canisters to leak.

3.1.10 Replace the 0.2 micron final filter.

3.2 Sanitation of System

3.2.1 Turn system off, disconnect power, and shut the feed-water valve.

3.2.2 Relieve pressure in the system by opening and closing the faucet valve.

3.2.3 After the used cartridges and springs are removed, wash the inside of the canisters and inside of the heads with a solution of Liquinox and warm water.

3.2.4 Rinse with water several times to remove any soap residue.

3.2.5 Prepare four gallons of disinfecting solution using ~ 1 qt. of bleach (5.25% sodium hypochlorite) to ~ 4 gal. of water to make a 0.3% solution.

3.2.6 Fill each empty canister about one-half full with the disinfecting solution and reattach canisters to unit.

3.2.7 Soak the springs in disinfecting solution for five to ten minutes.

3.2.8 Remove the 0.2 micron final filter from the unit and disconnect the feed-water line at the water source.

3.2.9 Insert the feed-water inlet line into the remaining disinfecting solution.

3.2.10 Reconnect the power supply and start the pump.

3.2.11 Drain off some of the solution through the faucet valve until a steady flow is achieved.

3.2.12 Close the faucet valve and let the solution recirculate for one-half hour then drain.

NOTE: Watch the level of disinfectant in the container. Do not let the pump operate dry as this will damage it severely.

3.2.13 Leaving the faucet valve open, turn off the unit and disconnect the power.

3.2.14 Remove all the canisters and drain the remaining contents. Do not rinse the canisters.

3.2.15 Install new filter cartridges in the system. (Refer to sections 3.1 to 3.1.10).

NOTE: It may not be possible to rinse the MACROPURE™ filter cartridge since all the ion exchange filter cartridges have been removed.

3.2.16 Reconnect the feed-water line to the system.

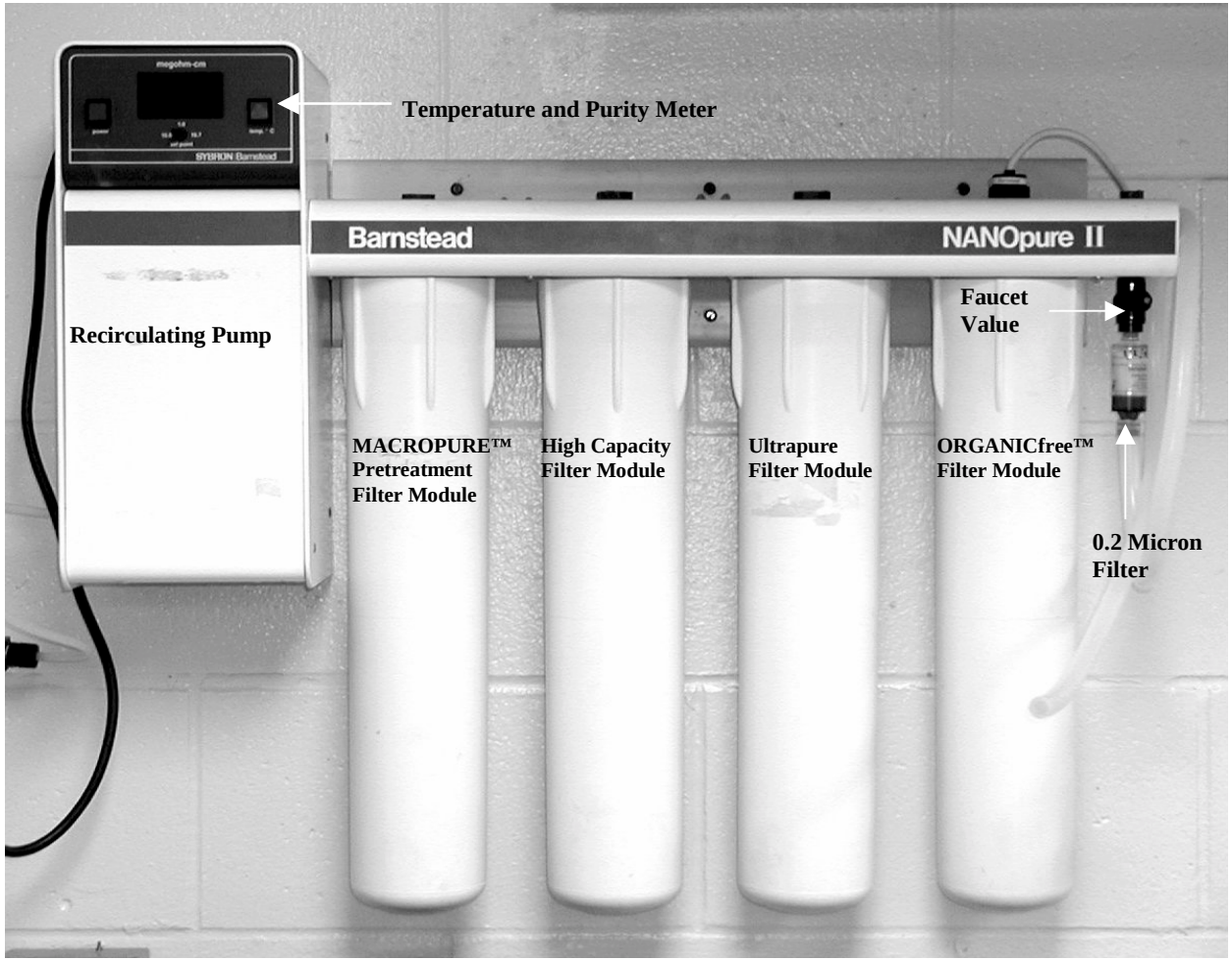
3.2.17 Open the feed-water valve and the faucet valve. Reconnect the power and start the pump to allow the system to flush out any remaining disinfectant.

3.2.17 Close the faucet valve and allow the resistivity of the water to rise above the "set-point" of the resistivity meter. Install a new 0.2 micron final filter at the faucet and flush the filter with at least two liters of water.

4.0 REFERENCES

- Barnstead Nanopure Manual

Appendix A



Filter Cartridges: D0836 D0803 D0809 D0820
CAT# D3807
Fisher Catalog #09-050-238